

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Lee Watts, et al.
Serial No.: 10/775,033
Filed: February 9, 2004
Group Art Unit: 3753
Examiner: Fox, John C.
Title: EXHAUST PIPE VALVE

M/S AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Dear Sir:

Appellant submits this Appeal Brief along with a Notice of Appeal in response to the Final Rejection of June 30, 2010. All appeal fees were paid with Appellant's first appeal. Any additional fees or credits may be charged or applied to Deposit Account No. 50-1482 in the name of Carlson, Gaskey & Olds.

REAL PARTY IN INTEREST

The real party in interest is EMCON TECHNOLOGIES LLC, assignee of the present invention as recorded at Reel/Frame: 023957 / 0741.

RELATED APPEALS AND INTERFERENCES

Appellant has already completed one appeal for this application, which resulted in a favorable decision for appellant (Appeal 2009-003657). A copy of the Decision On Appeal is attached in the Related Proceedings Appendix.

STATUS OF CLAIMS

Claims 1, 3-7, 9, 11-17, 19-22, and 24-32 are pending, rejected, and appealed. Claims 2, 8, 10, 18, and 23 have been cancelled.

STATUS OF AMENDMENTS

All amendments and responses have been entered and considered.

SUMMARY OF CLAIMED SUBJECT MATTER

Independent claim 1 is directed to an exhaust pipe valve that includes a housing 12 with a cylindrical portion 40 defining a bore; a bearing sleeve 22 comprising a cylindrical body mounted within the bore 40 and completely surrounded by the housing and having a primary bearing surface 24; a valve spindle 16 rotatably mounted in the bearing sleeve 22 and having a primary sealing surface 20 that is in direct abutting engagement with the primary bearing surface 24 of the bearing sleeve 22; and a valve plate 14 mounted at the valve spindle 16, wherein the primary bearing surface of the bearing sleeve 22 faces the valve plate 14. See page 6, lines 6-14; Page 7, lines 24-35; Figure 3. Claim 1 further recites a washer 30 arranged on the valve spindle 16, wherein the washer 30 cooperates with the bearing sleeve 22 on a side of the bearing sleeve 22 that faces away from the valve plate 14, the side of the bearing sleeve 22 that faces away from the valve plate 14 being a secondary bearing surface, and wherein the washer 30 has a secondary sealing surface that cooperates with the secondary bearing surface. See page 6, lines 26-30; Figure 3. Finally, claim 1 recites a spring 32 that biases the primary sealing surface of the valve spindle 16 against the primary bearing surface of the bearing sleeve 22 while biasing the washer

30 against the bearing sleeve 22. See page 4, line 29 through page 5, line 7; page 7, lines 3-6; Figure 3.

GROUND OF REJECTION TO BE REVIEWED ON APPEAL

A. Claims 1, 5, 9, 11-17, 26-29, and 31-32 stand rejected under 35 U.S.C. 102(b) as being anticipated by Cook (US 5401001).

B. Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cook (US 5401001).

C. Claims 6-7 stand rejected under 35 U.S.C. 103(a) as being unpatentable under 35 U.S.C. 103(a) over Cook (US 5401001) in view of Fodor et al. (US 5496142).

D. Claims 19-22 stand rejected under 35 U.S.C. 103(a) as being unpatentable under 35 U.S.C. 103(a) over Cook (US 5401001) in view of Ong et al. (US 5645900).

E. Claims 24-25 stand rejected under 35 U.S.C. 103(a) as being unpatentable under 35 U.S.C. 103(a) over Cook (US 5401001) in view of Bartz (US 1911787)

F. Claims 1, 3-5, 11-16, 24-28, and 31-32 stand rejected under 35 U.S.C. 103(a) as being unpatentable under 35 U.S.C. 103(a) over Thauer (US 3693935) in view of Kuramoto et al. (US 4231341).

G. Claims 9 and 17 stand rejected under 35 U.S.C. 103(a) as being unpatentable under 35 U.S.C. 103(a) over Thauer (US 3693935) in view of Kuramoto et al. (US 4231341) and further in view of Cook (US 5401001).

H. Claims 6-7 stand rejected under 35 U.S.C. 103(a) as being unpatentable under 35 U.S.C. 103(a) over Thauer (US 3693935) in view of Kuramoto et al. (US 4231341) and further in view of Fodor et al. (US 5496142).

I. Claims 19-22 stand rejected under 35 U.S.C. 103(a) as being unpatentable under 35 U.S.C. 103(a) over Thauer (US 3693935) in view of Kuramoto et al. (US 4231341) and further in view of Ong et al. (US 5645900).

J. Claims 29-30 stand rejected under 35 U.S.C. 103(a) as being unpatentable under 35 U.S.C. 103(a) over Thauer (US 3693935) in view of Kuramoto et al. (US 4231341) and further in view of Hester et al. (US 3916943).

ARGUMENT

A. Anticipation Rejection - Cook

Claims 1, 5, 9, 11-17, 26-29, and 31-32 stand rejected under 35 U.S.C. 102(b) as being anticipated by Cook (US 5401001).

Claims 1, 9, 11-17

Claim 1 recites the feature of a valve spindle rotatably mounted in the bearing sleeve and having a primary sealing surface that is in direct abutting engagement with the primary bearing surface of the bearing sleeve. Cook does not disclose or teach this feature.

The examiner argues that Cook discloses a bearing 28 and a valve spindle 24 that is in direct abutting engagement with the bearing sleeve 28. Appellant respectfully disagrees. Cook discloses a shaft 24 that supports a plurality of washers 36, 38, 40. The shaft 24 extends through bearing 28 and opposite end faces of the bearing directly abut against washers 38, 40. A second washer 36 is positioned inboard of washer 38. The shaft 24 is therefore clearly not in direct abutting engagement with the bearing 28.

The examiner argues that washer 38 is read as being part of valve spindle 24. Specifically, the examiner argues that there is no language found in the claims that require the spindle to be a single piece or which precludes the spindle from being a plurality of elements. Appellant respectfully asserts that this interpretation is not reasonable as this renders the claim language meaningless.

Claims in a patent application are to be given their broadest reasonable interpretation, with this interpretation being consistent with the specification of the patent application (see, for example, In re Zletz, 893 F.2d 319,321; 13 USPQ2d 1320, 1322 (Fed. Cir. 1989)). Further, the terms in the claims should be construed as one of ordinary skill in the art would construe them (see, for example, Specialty Composites v. Cabot Corp. 845 F.2d 981, 986; 6 USPQd 1601, 1604

(Fed. Cir. 1988)). Further, as discussed in Phillipps v. AWH Corp., 415 F.3rd 1303, 1315; 75 USPQ2d, 1321, 1327 (Fed. Cir. 2005), the claims do not stand alone and are part of a fully integrated written instrument with a specification that concludes with the claims. Thus, the claims must be read in view of the specification, of which they are a part.

Claim 1 recites that the valve spindle has a primary bearing surface that is in direct abutting engagement with the primary bearing surface of the bearing sleeve. This is clearly shown in Figures 3, 4, and 7-9. Further, the specification describes that this contact interface provides a primary seal that almost entirely prevents any leakage of the exhaust gas through the valve. Cook discloses two separate washers 36, 38 that are located between the shaft and the bearing. One of ordinary skill in the art would not interpret Cook as disclosing direct contact between the shaft and the bearing, especially as each added washer component increases the amount of leakage that would occur.

Further, using the examiner's interpretation that the shaft could be made of a plurality of elements and that the washer is therefore considered to also comprise the shaft 24, anything shown in Figure 2 would be considered as part of the shaft. For example, the housing 20 and bellows 44 also cooperate to help seal the bearing. Are they also considered to be part of the shaft? Certainly, these components cannot be considered as being part of the shaft. Washers 36, 38, 40 also cannot be reasonably considered as being the shaft. Cook specifically describes the shaft 24 and washers 36, 38, 40 as separate components. Further, the washers are made from different materials and serve different purposes (see col. 4, lines 22-28).

As such, Appellant respectfully asserts that Cook does not disclose or teach a valve spindle rotatably mounted in the bearing sleeve that has a primary sealing surface that is in direct abutting engagement with the primary bearing surface of the bearing sleeve. Thus, Cook cannot anticipate claims 1, 9, and 11-17.

Claim 5

Claim 5 is allowable for the same reason claim 1 is allowable. Further, claim 5 recites that a nut is mounted on the valve spindle. The examiner argues that Cook discloses a nut 62.

Appellant disagrees. Element 62 comprises a deformed portion of the shaft 24 (see col. 4, lines 36-39). Thus, Cook does not anticipate claim 5.

Claim 26

Claim 26 is allowable for the same reason claim 1 is allowable. Further, claim 26 recites the secondary sealing surface of the washer is in direct abutting engagement with the bearing sleeve such that the bearing sleeve is sandwiched directly between the washer and the valve spindle.

Cook does not disclose or teach a bearing sleeve that is sandwiched directly between the washer and the valve spindle. Instead, Cook teaches sandwiching bearing 28 directly between two ceramic washer 38, 40. As such, Cook does not anticipate claim 26.

Claim 27

Claim 27 is allowable for the same reason claim 1 is allowable. Further, claim 27 recites that the bearing sleeve is received within the bore at a press-fit interface which securely holds the bearing sleeve within the housing without requiring any additional securing structures.

The examiner argues that Cook discloses that bearing 28 is pressed into bore 52 and is thus read as not requiring the crimp, which is redundant. Appellant respectfully asserts that there is no basis for this assumption. Cook clearly recites that both bearings are installed into their respective bores and then a crimping operation is performed to secure the bearings in the housing (see col. 3, line 52- col. 4, line 12). Cook states that this mounting configuration creates a bearing to housing wall sealing interface. There is nothing found in Cook to suggest that the crimp is a redundant fastening step. As such, Cook does not disclose or teach a bearing that is press-fit into the housing and is secured in place without requiring any additional securing structures as claimed.

Claim 28

Claim 28 is allowable for the same reason claim 1 is allowable. Further, claim 28 recites that the bearing sleeve comprises a sole bearing structure that supports the valve spindle. Cook clearly shows that the shaft 24 is supported by first and second bearings 26, 28. As such, Cook does not disclose or teach a configuration where one bearing sleeve comprises a sole bearing structure that supports the valve spindle as claimed. Further, the examiner offers no explanation of where this is found in Cook. Thus, the examiner has failed to set forth a legally sufficient rejection of claim 28.

Claim 29

Claim 29 is allowable for the same reason claim 1 is allowable. Further, claim 29 recites that the cylindrical body has a first end face that defines the primary bearing surface and a second end face opposite the first end face that defines the secondary bearing surface, and wherein the valve spindle includes a shoulder located within the bore that defines the primary sealing surface, and wherein the washer is received within the bore such that the primary sealing surface and the primary bearing surface are in direct abutting engagement with each other and the secondary sealing surface and the secondary bearing surface are in direct abutting engagement with each other within the bore.

Cook does not disclose or teach this configuration. Shaft 24 does not include a shoulder that defines a primary sealing surface that is located within the housing bore as claimed. Further, Cook clearly does not disclose or teach such a shoulder that is in direct abutting engagement with an end face of the bearing sleeve as claimed. Instead, the bearing 28 of Cook is in direct abutting engagement with ceramic washer 38. Further, the examiner offers no explanation of where this claimed feature is found in Cook. Thus, the examiner has failed to set forth a legally sufficient rejection of claim 29.

Claim 31

Claim 31 is allowable for the same reason claim 1 is allowable. Further, claim 31 recites that the bearing sleeve is defined by an overall axial length extending from a first end face to a second end face, and wherein an outer diameter of the bearing sleeve is generally constant from the first end face to the second end face. The examiner argues that Cook discloses this feature because the majority of the bearing has a constant outer diameter. Appellant respectfully disagrees.

Each end of the bearing 28 includes a reduced diameter portion. As such, Cook clearly does not disclose or teach a bearing sleeve that has a constant outer diameter from a first end face to a second end face. Thus, claim 31 is not anticipated by Cook.

Claim 32

Claim 32 is allowable for the same reason claim 1 is allowable. Further, claim 32 recites that the cylindrical portion of the housing has a generally constant inner diameter extending from one end of the bore to an opposite end of the bore. The examiner argues that Cook discloses this feature because the majority of the cylindrical portion has a constant inner diameter. Appellant respectfully disagrees.

The cylindrical portion of the housing in Cook is disclosed as being defined by at least three different inner diameters. As such, Cook clearly does not disclose or teach a cylindrical portion of a housing that has a constant inner diameter from one end of a bore to an opposite end of the bore. Thus, claim 32 is not anticipated by Cook.

B. Obviousness Rejection - Cook

Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cook (US 5401001).

Claims 11-12

The examiner argues that Cook discloses one of a concentric and eccentric plate and that the use of the other of a concentric and eccentric plate would be an obvious matter of design choice. Appellant respectfully asserts that claims 11-12 are allowable for the same reasons set forth above with regard to claim 1.

C. Obviousness Rejection – Cook and Fodor

Claims 6-7 stand rejected under 35 U.S.C. 103(a) as being unpatentable under 35 U.S.C. 103(a) over Cook (US 5401001) in view of Fodor et al. (US 5496142).

Claim 6

Claim 6 recites that the spring is a spring washer. The examiner argues that it would be obvious to substitute the spring washer of Fodor for the diaphragm spring of Cook. Appellant respectfully asserts that claim 6 is allowable for the same reasons set forth above with regard to claim 5.

Further, appellant respectfully asserts that Cook teaches a beneficial configuration that is provided by the bellows 44 (see col. 4, lines 29-62). Substituting a spring washer would defeat the benefits provided by the bellows. The United States Supreme Court has confirmed that “when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be non-obvious” (KSR Int’lCo. v. Teleflex, Inc. et al., 127 S.Ct. 1727 (2007)). Further, the proposed modification cannot render the prior art unsatisfactory for its intended purpose (see MPEP 2143.01 (V)) and cannot change the principle of operation of a reference (see MPEP 2143.01 (VI)).

Claim 7

Claim 7 recites that the spring is made from a nickel-chromium-iron alloy. Appellant respectfully asserts that claim 7 is allowable for the same reasons set forth above with regard to

claim 1. Further, the references do not disclose or teach making the spring from a material as set forth in the claim.

D. Obviousness Rejection – Cook and Ong

Claims 19-22 stand rejected under 35 U.S.C. 103(a) as being unpatentable under 35 U.S.C. 103(a) over Cook (US 5401001) in view of Ong et al. (US 5645900).

Claims 19-22

Claim 19 is allowable for the same reasons claim 1 is allowable. Further, claim 19 recites that there is a ceramic coating disposed on at least a portion of at least one of the valve spindle and the washer. The examiner argues that it would be obvious to use a plurality of titanium coatings on a metal substrate instead of the ceramic washers found in Cook as a substitution of one known element for another. Appellant respectfully disagrees. The examiner's proposed modification would incur no benefit to Cook. Cook discloses a specific washer 26, 28, 40 and bellows 44 configuration that provides a desired level of sealing. There is nothing found in Cook or Ong to suggest that the examiner's proposed modification would provide such a level of sealing. Thus, claims 19-22 are allowable over the recited combination.

E. Obviousness Rejection – Cook and Bartz

Claims 24-25 stand rejected under 35 U.S.C. 103(a) as being unpatentable under 35 U.S.C. 103(a) over Cook (US 5401001) in view of Bartz (US 1911787)

Claim 24

Claim 24 is allowable for the same reasons claim 1 is allowable. Further, claim 24 recites that the secondary sealing and secondary bearing surfaces have conical profiles. The examiner argues that Bartz discloses a bearing 17 and a bushing 45 which is read as a seal. Appellant respectfully disagrees. Element 45 is described as "packing" (see page 2, lines 1-4). There is nothing found in Bartz to suggest that this packing 45 comprises a seal. Further, packing 45 appears to be comprised of a porous material.

The definition of what constituted a sealing surface was discussed in detail in the Board's prior Decision on Appeal (see Related Proceeding's Appendix, Section E Analysis, Pages 5-8). Appellant respectfully asserts that there is nothing found in Bartz to suggest that components 45 and 17 providing a sealing surface as claimed. Further, claim 24 recites that the secondary sealing surface of the washer has a conical profile. There is nothing found in either reference that would suggest that a washer be modified to include a conical sealing surface. Packing 45 clearly cannot be considered as corresponding to the claimed washer. Thus, claim 24 is clearly allowable over the recited combination.

Claim 25

Claim 25 is allowable for the same reasons claim 1 is allowable. Further, claim 25 recites that the primary sealing surface and the primary bearing surface each have a conical profile that cooperate with each other to form a primary seal and wherein the secondary sealing surface and the secondary bearing surface each have a conical profile that cooperate with each other to form a secondary seal.

For the reasons set forth above with regard to claim 24, Appellant respectfully asserts that the recited combination does not disclose or teach secondary sealing and secondary bearing surfaces that have conical profiles. Further, the recited combination does not disclose or teach a valve shaft with a primary sealing surface that has a conical profile. The examiner fails to identify where either reference discloses or teaches a valve spindle with a primary sealing surface that has a conical profile. The shaft 24 in Cook clearly does not disclose such a configuration. Bartz also does not disclose such a shaft, see Figure 3. Thus, claim 25 is clearly allowable over the recited combination.

F. Obviousness Rejection – Thauer and Kuramoto

Claims 1, 3-5, 11-16, 24-28, and 31-32 stand rejected under 35 U.S.C. 103(a) as being unpatentable under 35 U.S.C. 103(a) over Thauer (US 3693935) in view of Kuramoto et al. (US 4231341).

Claims 1, 3-5, 11-13, 15-16, 24-25, 28, 32

Claim 1 recites that a bearing sleeve comprises a cylindrical body that is mounted within the bore and completely surrounded by the housing. The examiner admits that Thauer does not disclose this and argues that it would be obvious to replace the bearing of Thauer with a bearing as taught by Kuramoto. Appellant respectfully asserts that Thauer teaches away from such a modification.

The United States Supreme Court has confirmed that “when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be non-obvious” (KSR Int’lCo. v. Teleflex, Inc. et al., 127 S.Ct. 1727 (2007)). Further, the proposed modification cannot render the prior art unsatisfactory for its intended purpose (see MPEP 2143.01 (V)) and cannot change the principle of operation of a reference (see MPEP 2143.01 (VI)).

Thauer discloses a beneficial bearing arrangement where the bearing 3 includes an enlarged flange 4 that is used to radially position the bearing within the bore and which abuts against an outer surface of the housing in a sealing relation therewith (see col. 2, lines 1-12). Modifying Thauer in the manner proposed by the examiner would eliminate the capability of accurately adjusting the radial position of the bearing as taught by Thauer. Thus, Thauer clearly teaches away from the proposed modification and such a modification would render Thauer unsatisfactory for its intended purpose.

Claim 1 further recites the feature of a washer arranged on the valve spindle, wherein the washer cooperates with the bearing sleeve on a side of the bearing sleeve that faces away from the valve plate, the side of the bearing sleeve that faces away from the valve plate being a secondary bearing surface, and wherein the washer has a secondary sealing surface that cooperates with the secondary bearing surface.

The examiner admits that Thauer does not disclose or teach such a washer. The examiner argues that Kuramoto teaches such a washer and further argues that it would be obvious to use

this washer in the valve of Thauer to similarly seal against the bearing thereof. Appellant respectfully disagrees.

Thauer discloses a configuration where a collar 8 on shaft 5 engages a bearing 3 under spring bias to maintain a complete and adequate seal (see col. 2, lines 43-47). As such, there would be no need to include a collar 20 such as that shown in Kuramoto as this would be redundant.

Further, due to the complete seal provided between collar 8 and bearing 3, Thauer discloses that the conical surfaces at this sealed interface center the shaft 5 within the bore 3a to provide adequate clearance for a full 360 degrees between the shaft 5 and bore 3a to prevent binding of the shaft within the bore. Collar 20 of Kuramoto, which the examiner argues should be included in Thauer, teaches a sealing interface by having the collar 20 be sealingly fitted on the shaft 13 (see col. 2, lines 42-43). Sealing this collar on the shaft 5 of Thauer would not provide the adequate clearance as required by Thauer. Thus, Thauer teaches away from the proposed modification. Further, such a modification would render Thauer unsatisfactory for its intended purpose and would change the principle of operation of Thauer.

There is nothing found in either reference, or in the prior art, to suggest that a bearing sleeve be sealed at both ends as claimed. The only teaching of this is found in the subject application. The examiner is clearly engaging in a hindsight reconstruction of the claimed invention, using appellant's structure as a template and selecting elements from the references to fill the gaps. This is not permissible under 35 U.S.C. 103(a). Thus, claims 1, 3-5, 11-13, 15-16, 24-25, 28, 32 are allowable over the recited combination.

Claims 14 and 27

Claim 14 is allowable for the same reasons claim 1 is allowable. Further, claim 14 recites that the bearing sleeve is press-fitted into the housing. The examiner argues that it would be obvious to use a press fit bearing as taught by Kuramoto as a simple substitution of one known element for another. Appellant respectfully disagrees.

One of the benefits provided by Thauer is that the shaft 5, valve 7, bearing 3, spring 11, and lever 12 are pre-assembled as a unit prior to application to the pipe 2, such that the unit can be easily installed by threading the bearing 3 into the bore 1. See col. 2, line 64 through col. 3, line 5. Further, the threaded attachment interface assists in radially positioning the bearing (see col. 2, lines 1-12). The examiner's proposed modification would require the elimination of the threaded attachment assembly, which would defeat one of the benefits provided by Thauer. The examiner's proposed modification cannot render the prior art unsatisfactory for its intended purpose and cannot change the principle of operation of the base reference. See MPEP 2143.01. Thus, claims 14 and 27 are allowable over the recited combination because Thauer clearly teaches away from the examiner's proposed modification.

Claim 26

Claim 26 is allowable for the same reasons claim 1 is allowable. Further, claim 26 recites that the bearing sleeve is sandwiched directly between the washer and the valve spindle. Neither reference discloses or teaches a bearing sleeve that is directly sandwiched between a spindle and washer as claimed. Further, Thauer teaches a bearing 3 that is sandwiched directly between the collar 8 and a disc 13. The disc 13 provides the beneficial use of a heat shield. As such, Appellant respectfully asserts that Thauer teaches away from the examiner's proposed modification.

Claim 31

Claim 31 is allowable for the same reasons claim 1 is allowable. Further, claim 31 recites that the bearing sleeve is defined by an overall axial length extending from a first end face to a second end face, and wherein an outer diameter of the bearing sleeve is generally constant from the first end face to the second end face. Thauer teaches away from such a configuration.

Thauer discloses a bearing 3 that includes an enlarged flange at one end that is useful to radially position the bearing in the bore in an accurate manner (see col. 2, lines 1-12). As such,

Thauer clearly teaches away from providing a bearing sleeve that would have a constant outer diameter from one end face to an opposite end face as claimed.

G. Obviousness Rejection – Thauer, Kuramoto, and Cook

Claims 9 and 17 stand rejected under 35 U.S.C. 103(a) as being unpatentable under 35 U.S.C. 103(a) over Thauer (US 3693935) in view of Kuramoto et al. (US 4231341) and further in view of Cook (US 5401001).

Claims 9 and 17

Claims 9 and 17 are allowable for the same reasons claim 1 is allowable. Cook does not make up for the deficiencies of Thauer and Kuramoto.

H. Obviousness Rejection – Thauer, Kuramoto, and Fodor

Claims 6-7 stand rejected under 35 U.S.C. 103(a) as being unpatentable under 35 U.S.C. 103(a) over Thauer (US 3693935) in view of Kuramoto et al. (US 4231341) and further in view of Fodor et al. (US 5496142).

Claims 6 and 7

Claims 6 and 7 are allowable for the same reasons claim 1 is allowable. Fodor does not make up for the deficiencies of Thauer and Kuramoto.

I. Obviousness Rejection – Thauer, Kuramoto, and Ong

Claims 19-22 stand rejected under 35 U.S.C. 103(a) as being unpatentable under 35 U.S.C. 103(a) over Thauer (US 3693935) in view of Kuramoto et al. (US 4231341) and further in view of Ong et al. (US 5645900).

Claims 19-22

Claim 19 is allowable for the same reasons claim 1 is allowable. Further, claim 19 recites that there is a ceramic coating disposed on at least a portion of at least one of the valve spindle and the washer. The examiner argues that it would be obvious to use a plurality of titanium coatings with the bearing surfaces of Thauer as a substitution of one known element for another. Appellant respectfully disagrees. There is nothing found in Cook or Ong to suggest that a coating be applied to a valve spindle shaft or bearing sleeve. Thus, claims 19-22 are allowable over the recited combination.

J. Obviousness Rejection – Thauer, Kuramoto, and Hester

Claims 29-30 stand rejected under 35 U.S.C. 103(a) as being unpatentable under 35 U.S.C. 103(a) over Thauer (US 3693935) in view of Kuramoto et al. (US 4231341) and further in view of Hester et al. (US 3916943).

Claims 29-30

Claim 29 is allowable for the same reasons claim 1 is allowable. Further, claim 29 recites the valve spindle includes a shoulder located within the bore that defines the primary sealing surface, and wherein the washer is received within the bore such that the primary sealing surface and the primary bearing surface are in direct abutting engagement with each other and the secondary sealing surface and the secondary bearing surface are in direct abutting engagement with each other within the bore.

The examiner admits that Thauer does not disclose this configuration and argues that it would be obvious to modify Thauer to dispose the primary seal as taught by Hester to provide an effective primary seal. Appellant respectfully asserts that there is no basis to support this assertion. There is nothing found in the prior art to indicate that the Hester provides a more effective seal than that already disclosed by Thauer.

Further, Hester is not relevant as is directed to plastic plug valve to control the flow of corrosive fluids. Hester is clearly not within the field of the inventor's endeavor and is not

reasonably pertinent to the problem with which the applicant was involved. Thus, claims 29-30 are allowable over the recited combination.

CONCLUSION

For the reasons set forth above, the rejection of all claims is improper and should be reversed. Appellant earnestly requests such an action.

Respectfully submitted,

/Kerrie A. Laba/

Kerrie A. Laba, Reg. No. 42,777

Carlson, Gaskey & Olds

400 W. Maple Road, Ste. 350

Birmingham, MI 48009

(248) 988-8360

Dated: September 30, 2010

CLAIMS APPENDIX

1. An exhaust pipe valve, comprising:
 - a housing including a cylindrical portion defining a bore;
 - a bearing sleeve comprising a cylindrical body mounted within the bore and completely surrounded by the housing and having a primary bearing surface;
 - a valve spindle rotatably mounted in the bearing sleeve and having a primary sealing surface that is in direct abutting engagement with the primary bearing surface of the bearing sleeve;
 - a valve plate mounted at the valve spindle, wherein the primary bearing surface of the bearing sleeve faces the valve plate;
 - a washer arranged on the valve spindle, wherein the washer cooperates with the bearing sleeve on a side of the bearing sleeve that faces away from the valve plate, the side of the bearing sleeve that faces away from the valve plate being a secondary bearing surface, and wherein the washer has a secondary sealing surface that cooperates with the secondary bearing surface; and
 - a spring that biases the primary sealing surface of the valve spindle against the primary bearing surface of the bearing sleeve while biasing the washer against the bearing sleeve.
3. The exhaust pipe valve according to claim 1, wherein at least one of the primary sealing surface, the secondary sealing surface, the primary bearing surface and the secondary bearing surface has a conical profile.
4. The exhaust pipe valve according to claim 1, wherein at least one of the primary sealing surface and the primary bearing surface has a conical profile.
5. The exhaust pipe valve according to claim 1, further comprising a nut mounted on the valve spindle, wherein the spring is disposed between the nut mounted on the valve spindle and the washer.

6. The exhaust pipe valve according to claim 5, wherein the spring is a spring washer.

7. The exhaust pipe valve according to claim 1, wherein the spring is made from a nickel-chromium-iron alloy.

8.

9. The exhaust pipe valve according to claim 1, wherein the valve spindle is made from steel.

11. The exhaust pipe valve according to claim 1, wherein the valve plate is mounted centrically at the valve spindle and cooperates with an inner wall of the housing.

12. The exhaust pipe valve according to claim 1, wherein the valve plate is mounted eccentrically at the valve spindle and cooperates with two valve seats in an interior of the housing.

13. The exhaust pipe valve according to claim 1, further comprising a lever attached to the valve spindle for operation of the valve plate.

14. The exhaust pipe valve according to claim 1, wherein the bearing sleeve is press-fitted into the housing.

15. The exhaust pipe valve according to claim 14, wherein the housing comprises a cylindrical portion in which the bearing sleeve is fitted.

16. The exhaust pipe valve according to claim 1, wherein the bearing sleeve is fixed in the housing in a form-locking manner.

17. The exhaust pipe valve according to claim 1, wherein the bearing sleeve is made from steel.

19. The exhaust pipe valve according to claim 1, further comprising a ceramic coating disposed on at least a portion of at least one of the valve spindle and the washer.

20. The exhaust pipe valve according to claim 19, wherein the ceramic coating comprises at least one selected from the group consisting of titanium, aluminum, and chromium.

21. The exhaust pipe valve according to claim 20, wherein the ceramic coating further comprises at least one of yttrium and nitrogen.

22. The exhaust pipe valve of claim 19, further comprising a second ceramic coating disposed on the ceramic coating, wherein the second ceramic coating comprises at least one selected from the group consisting of titanium, aluminum, and chromium.

24. The exhaust pipe valve according to claim 1 wherein the secondary sealing and secondary bearing surfaces have conical profiles.

25. The exhaust pipe valve according to claim 1 wherein the primary sealing surface and the primary bearing surface each have a conical profile that cooperate with each other to form a primary seal and wherein the secondary sealing surface and the secondary bearing surface each have a conical profile that cooperate with each other to form a secondary seal.

26. The exhaust pipe valve according to claim 1, wherein the secondary sealing surface of the washer is in direct abutting engagement with the bearing sleeve such that the bearing sleeve is sandwiched directly between the washer and the valve spindle.

27. The exhaust pipe valve according to claim 1, wherein the bearing sleeve is received within the bore at a press-fit interface which securely holds the bearing sleeve within the housing without requiring any additional securing structures.

28. The exhaust pipe valve according to claim 1, wherein the bearing sleeve comprising a sole bearing structure that supports the valve spindle.

29. The exhaust pipe valve according to claim 1, wherein the cylindrical body has a first end face that defines the primary bearing surface and a second end face opposite the first end face that defines the secondary bearing surface, and wherein the valve spindle includes a shoulder located within the bore that defines the primary sealing surface, and wherein the washer is received within the bore such that the primary sealing surface and the primary bearing surface are in direct abutting engagement with each other and the secondary sealing surface and the secondary bearing surface are in direct abutting engagement with each other within the bore.

30. The exhaust pipe valve according to claim 29, wherein the primary sealing surface and the primary bearing surface each have a conical profile that directly engage each other to form a primary seal and wherein the secondary sealing surface and the secondary bearing surface each have a conical profile that directly engage each other to form a secondary seal.

31. The exhaust pipe valve according to claim 1, wherein the bearing sleeve is defined by an overall axial length extending from a first end face to a second end face, and wherein an outer diameter of the bearing sleeve is generally constant from the first end face to the second end face.

32. The exhaust pipe valve according to claim 31, wherein the cylindrical portion of the housing has a generally constant inner diameter extending from one end of the bore to an opposite end of the bore.

EVIDENCE APPENDIX

None

RELATED PROCEEDINGS APPENDIX

Appeal 2009-003657



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/775,033	02/09/2004	Lee Watts	67341-1985; 03MRA0135	6920
76799	7590	09/25/2009	EXAMINER	
PAMELA A. KACHUR			FOX, JOHN C	
950 W 450 S			ART UNIT	
BLDG. 4			PAPER NUMBER	
COLUMBUS, IN 47201			3753	
			MAIL DATE	DELIVERY MODE
			09/25/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ARVIN TECHNOLOGIES, INC.

Appeal 2009-003657
Application 10/775,033
Technology Center 3700

Decided: September 25, 2009

Before JAMESON LEE, SALLY C. MEDLEY, and
MICHAEL P. TIERNEY, *Administrative Patent Judges*.

LEE, *Administrative Patent Judge*.

DECISION ON APPEAL

A. STATEMENT OF THE CASE

This is a decision on appeal by the real party in interest, Arvin Technologies, Inc. [ATI], under 35 U.S.C. § 134(a) from a final rejection of claims 1 and 3-25. We have jurisdiction under 35 U.S.C. § 6(b). We reverse.

References Relied on by the Examiner

Rautenstrauch	1,991,173	Feb. 12, 1935
Thauer	3,693,935	Sept. 26, 1972
Kipp et al. [Kipp]	5,630,571	May 20, 1997
Lee	5,631,761	May 20, 1997
Welty et al. [Welty]	6,935,618 B2	Aug. 30, 2005

The Rejections on Appeal

The Examiner rejected claims 1, 3-5, 11, 13, and 16 under 35 U.S.C. § 102(b) as anticipated by Thauer.

The Examiner rejected claims 6, 14, and 15 under 35 U.S.C. § 103(a) as unpatentable over Thauer and Kipp.

The Examiner rejected claims 7-10, 12, 17, and 18 under 35 U.S.C. § 103(a) as unpatentable over Thauer.

The Examiner rejected claims 19-22 under 35 U.S.C. § 103(a) as unpatentable over Thauer, Lee, and Welty.

The Examiner rejected claims 23-25 under 35 U.S.C. § 103(a) as unpatentable over Thauer and Rautenstrauch.

The Invention

The invention relates to valves for exhaust pipes in which a bearing sleeve of the valve is sealed to prevent leakage of exhaust gas through the bearing sleeve. (Spec. ¶¶ 11-15.)

Independent claim 1 is reproduced below (App. Br. 14 Claims App'x):

An exhaust pipe valve, comprising:

a housing;

a bearing sleeve mounted in the housing and having a primary bearing surface;

a valve spindle rotatably mounted in the bearing sleeve and having a primary sealing surface that cooperates with the primary bearing surface of the bearing sleeve;

a valve plate mounted at the valve spindle, wherein the primary bearing surface of the bearing sleeve faces the valve plate;

a washer arranged on the valve spindle, wherein the washer cooperates with the bearing sleeve on a side of the bearing sleeve that faces away from the valve plate, the side of the bearing sleeve that faces away from the valve plate being a secondary bearing surface, and wherein the washer has a secondary sealing surface that cooperates with the secondary bearing surface; and

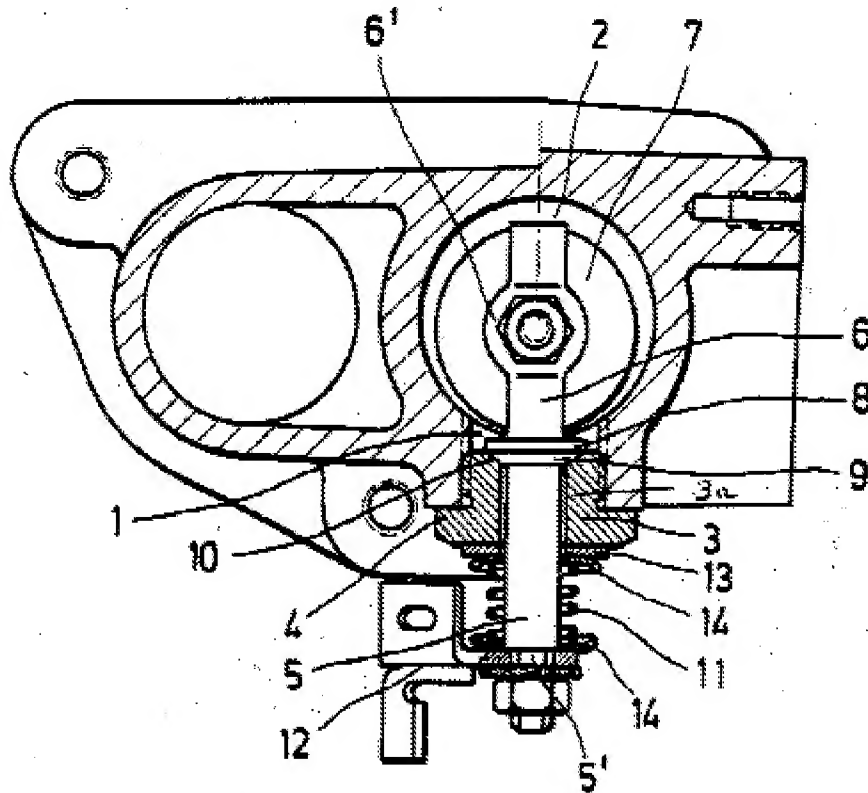
a spring that biases the primary sealing surface of the valve spindle against the primary bearing surface of the bearing sleeve while biasing the washer against the bearing sleeve.

B. ISSUE

Has ATI shown that the Examiner was incorrect in finding that Thauer discloses a washer having a secondary sealing surface that cooperates with a secondary bearing surface of a bearing sleeve?

C. FINDINGS OF FACT

1. Thauer discloses a throttle valve shaft in the exhaust gas pipe of an internal combustion engine. (Thauer 1:4-6.)
2. Thauer's figure is reproduced below:



The figure shows a throttle valve of an engine exhaust pipe.

3. Thauer discloses that insulating disc 13 on valve shaft 5 is interposed between spring 11 and bearing body 3 to shield the spring from heat. (Thauer 2:36-40.)

4. Thauer does not disclose that the connection of insulating disc 13 and bearing body 3 seals any structure.

5. The only sealing disclosed in Thauer is of bearing body 3 as provided by the connection of the collar 8 of valve shaft 5 and the upper conical surface 9 of the bearing body. (*Id.* at 2:24-28.)

6. Thauer describes that there is “substantial clearance” between the valve shaft and the bearing body. (*Id.* at 1:26-29.)

7. Thauer also discloses that it is only the upper seal of bearing body 3 that prevents gases from passing through the “clearance space” between the bearing body and valve shaft 5 and escaping from the bearing body. (*Id.* at 2:43-50.)

D. PRINCIPLES OF LAW

Anticipation is established only when a single prior art reference discloses all elements of the claimed invention. *In re Spada*, 911 F.2d 705, 708 (Fed. Cir. 1990).

E. ANALYSIS

We address first the anticipation rejection of claims 1, 3-5, 11, 13, and 16 based on Thauer. ATI argues dependent claims 3-5, 11, 13, and 16 collectively with independent claim 1. We focus on the disputed limitations.

ATI contends that Thauer does not disclose a washer with a secondary sealing surface required by claim 1. In particular, ATI argues that Thauer does not disclose a washer that “has a secondary sealing surface that cooperates with the secondary bearing surface” of a bearing sleeve. (App. Br. 3:17-19.)

The Examiner found that the above-quoted limitation was satisfied by the configuration of Thauer's insulating disc 13, termed a washer by the Examiner, and bearing body 3. The Examiner offered a meaning of "seal" as "substantial reduction in flow, even if not a complete elimination of flow." (Ans. 7:1-2.) The Examiner stated that the upper surface of washer 13 forms a sealing surface because it is a flat surface and would inherently form a seal of some degree with a flat surface of the bearing body when those surfaces are pressed together. (Ans. 3:22-4:7.)

The Examiner does not point to any support for the above-quoted definition of "seal" and is incorrect on the meaning of "sealing surface." A surface does not become a sealing surface simply because it is flat. The term "seal" means "to close hermetically." *Webster's II New Riverside University Dictionary* 1052 (1984). Thus, a "sealing surface" means a surface that operates to hermetically close something. That meaning is consistent with ATI's specification in which sealing surfaces operate to close off a bearing sleeve to prevent leakage of exhaust gas through the sleeve. (Spec. ¶¶ 23-25.) Simply pressing two flat surfaces together does not mean that the joint structure necessarily acts to hermetically close anything. If neither of the surfaces is associated with a structure that is open and allows fluid passage then nothing is closed when the surfaces are pressed together. That is, nothing is sealed.

ATI's claim 1 requires a bearing sleeve with a primary bearing surface and a valve spindle with a primary sealing surface that cooperates with the primary bearing surface. The claim also requires a washer arranged on the valve spindle that has a secondary sealing surface that cooperates with a secondary bearing surface of the bearing sleeve. The surface of the

valve spindle and the surface of the washer are each a “sealing surface” because they each cooperate with a bearing surface to seal the bearing sleeve.

On the other hand, Thauer discloses that insulating disc 13 on valve shaft 5 is simply interposed between spring 11 and bearing body 3 to shield the spring from heat. (Thauer 2:36-40.) Thauer does not disclose that the connection of insulating disc 13 and bearing body 3 hermetically closes or seals any structure. The only sealing disclosed in Thauer is of bearing body 3 as provided by the connection of the collar 8 of valve shaft 5 and the upper conical surface 9 of the bearing body. (*Id.* at 2:24-28.) The Examiner found that those structures correspond to the primary sealing surface and a primary bearing surface required by claim 1. However, with respect to the required secondary sealing surface, that a surface of insulating disc 13 and a surface of bearing body 3 are pressed together does not mean that either surface is a “sealing surface.”

Furthermore, Thauer describes that there is “substantial clearance” between the valve shaft and the bearing body. (*Id.* at 1:26-29.) Thauer also discloses that it is only the upper seal of bearing body 3 that prevents gases from passing through the “clearance space” between the bearing body and valve shaft 5 and escaping from the bearing body. (*Id.* at 2:43-50.) As shown in Thauer’s figure, the same clearance space appears to be present between insulating disc 13 and the valve shaft 5. Thus, if the upper seal of the bearing body were to fail, gases escaping the bearing body would pass through the clearance space between the insulating disc and valve shaft. The Examiner did not explain how, given that there is a clearance space between the insulating disc and valve shaft, the alleged “sealing surface” of the

insulating disc acts to seal the bearing body. Because Thauer does not disclose that its insulating disc 13 has any sealing function and absent any reasoning by the Examiner as to how a surface of that insulating disc hermetically closes any structure, we do not find that Thauer discloses a washer having a secondary sealing surface that cooperates with a secondary bearing surface as required by claim 1.

For the foregoing reasons, we do not sustain the rejection of claims 1, 3-5, 11, 13, and 16 as anticipated by Thauer.

Claims 6-10, 12, 14, 15, and 17-25 are each dependent, either directly or indirectly, on claim 1. Those dependent claims were rejected as unpatentable based on Thauer alone or on Thauer and one or more of Kipp, Lee, Welty, and Rautenstrauch. The Examiner's analysis of those claims is directed to limitations added by those claims and does not make up for the deficiencies of Thauer as discussed above. We also do not sustain the Examiner's rejections of claims 6-10, 12, 14, 15, and 17-25.

F. CONCLUSION

ATI has shown that the Examiner was incorrect in finding that Thauer discloses a washer having a secondary sealing surface that cooperates with a secondary bearing surface of a bearing sleeve.

G. ORDER

The rejection of claims 1, 3-5, 11, 13, and 16 under 35 U.S.C. § 102(b) as anticipated by Thauer is reversed.

The rejection of claims 6, 14, and 15 under 35 U.S.C. § 103(a) as unpatentable over Thauer and Kipp is reversed.

Appeal 2009-003657
Application 10/775,033

The rejection of claims 7-10, 12, 17, and 18 under 35 U.S.C. § 103(a) as unpatentable over Thauer is reversed.

The rejection of claims 19-22 under 35 U.S.C. § 103(a) as unpatentable over Thauer, Lee, and Welty is reversed.

The rejection of claims 23-25 under 35 U.S.C. § 103(a) as unpatentable over Thauer and Rautenstrauch is reversed.

REVERSED

KMF

Pamela A. Kachur
950 W 450 S, BLDG. 4
Columbus, IN 47201

<i>Notice of References Cited</i>	Application/Control No. 10/775,033	Applicant(s)/Patent Under Reexamination WATTS ET AL.	
	Examiner	Art Unit BPAI	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-			
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	Seal 2.b., Webster's II New Riverside University Dictionary, 1052 (1984).
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

WEBSTER'S II
New Riverside
University
Dictionary

Property of the U.S. Government

Words that are believed to be registered trademarks have been checked with authoritative sources. No investigation has been made of common-law trademark rights in any word, because such investigation is impracticable. Words that are known to have current registrations are shown with an initial capital and are also identified as trademarks. The inclusion of any word in this Dictionary is not, however, an expression of the Publisher's opinion as to whether or not it is subject to proprietary rights. Indeed, no definition in this Dictionary is to be regarded as affecting the validity of any trademark.

Copyright © 1984 by Houghton Mifflin Company. All rights reserved. No part of this work may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or by any information storage or retrieval system, except as may be expressly permitted by the 1976 Copyright Act or in writing by the Publisher.

All correspondence and inquiries should be directed to
Reference Division, Houghton Mifflin Company
One Beacon Street, Boston, MA 02108

Library of Congress Cataloging in Publication Data
Main entry under title:

Webster's II new Riverside university dictionary.

1. English language—Dictionaries. I. Riverside Publishing Company. II. Title: Webster's two new Riverside university dictionary. III. Title: Webster's 2 new Riverside university dictionary.

PE1625.W244 1984 423 83-3799

ISBN: 0-395-33957-X (thumb index, trade edition)
0-395-37928-8 (high school edition)

Manufactured in the United States of America

sea kale *n.* A European plant, *Crambe maritima*, with edible shoots and cabbage-like leaves.

sea king *n.* A Norse pirate chief of the early Middle Ages.

seal¹ (sēl) *n.* [ME *seel* < OFr. < Lat. *sigillum*, dim. of *signum*, sign.]

1. **a.** A signet or die with a raised or incised emblem used to stamp an impression on a soft substance, as wax or lead. **b.** The impression made. **c.** The emblem or design itself, belonging solely to the user. **d.** A small disk or wafer of wax, lead, or paper bearing such an imprint and used to close or authenticate a document. 2. Something, as a commercial hallmark, that serves to authenticate or confirm. 3. An adhesive agent, as wax or putty, used to close or secure something or prevent seepage of moisture or air. 4. A device or fluid in a drainpipe that prevents the upward passage of gas. 5. An airtight or watertight closure. 6. A small decorative paper sticker. —**vt.** **sealed, sealing, seals.** 1. To affix a seal to so as to prove authenticity or attest to a standard, as of accuracy, legal weight, or quality. 2. **a.** To close with or as if with a seal. **b.** To close hermetically. **c.** To make fast or fill up, as with plaster or cement. 3. To grant, certify, or designate under seal or authority. 4. To fix irrevocably <My fate was sealed>. 5. Mormon Ch. To make (e.g., a marriage) binding for life. —**seal off.** To close tightly. —**seal'a-ble** *adj.*

A word history: The noun *seal*, "a die used to stamp an impression," is related to the word *sign*. *Sign* is from Latin *signum*, which meant both "a mark" and "a signet ring." *Signum* formed a diminutive noun *sigillum*, which literally meant "little mark" but denoted especially the seal or impression left by a signet ring. *Sigillum* became *seel* in Old French, which was borrowed into English as *seal*. **seal**² (sēl) *n.* [ME *seel* < OE *seolh*.] 1. Any of various aquatic, carnivorous mammals of the families Phocidae and Otariidae, with a sleek streamlined body and limbs modified into paddlike flippers. 2. The pelt or fur of a seal, esp. a fur seal. 3. Leather made from the hide of a seal. —**vi.** **sealed, sealing, seals.** To hunt seals.

sea lamprey *n.* A large marine lamprey, *Petromyzon marinus*, sometimes used as food and parasitic to freshwater fish esp. in the Great Lakes.

sea-lane (sē'lan) *n.* An established or frequently used sea route.

seal-ant (sē'lant) *n.* A sealing agent.

sea lavender *n.* A salt-marsh plant of the genus *Limonium*, with small lavender or pinkish flower clusters.

sea legs *pl.n.* Informal. The ability to walk without faltering on board ship; esp. in rough seas.

sealer¹ (sē'lar) *n.* 1. One that seals. 2. A substance, as paint or varnish, used to size a surface. 3. An officer who tests and certifies weights and measures.

sealer² (sē'lar) *n.* A person or vessel engaged in seal hunting.

seal-ery (sē'lə-rē) *n., pl. -ies* 1. The process or occupation of hunting seals. 2. A place where seals are hunted.

sea lettuce *n.* A green seaweed of the genus *Ulva*, with thin, irregularly shaped leaflike fronds sometimes used as food.

sea level *n.* The level of the ocean's surface, esp. the mean level halfway between high and low tide, used as a standard in measuring land elevation or sea depths.

sea lily *n.* Any of various marine crinoids, usu. attached to the ocean floor in deep water, with a long stalk and a flowerlike body.

sealing wax *n.* A resinous mixture of shellac and turpentine, soft and fluid when heated and solid when cooled, used to seal letters, batteries, or jars.

sea lion *n.* An eared seal of the family Otariidae, esp. *Zalophus californianus* of the Northern Pacific, lacking the valuable underfur of the fur seal.

seal ring *n.* A signet ring.

seal-skin (sēl'skin) *n.* 1. The pelt or fur of a fur seal, esp. the underfur. 2. A garment made of sealskin.

Sealyham terrier (sē'lē-hām', -lē-əm) *n.* [After *Sealyham*, Wales.] A terrier orig. bred in Wales, with a long head, short legs, and a wiry white coat.



Sealyham terrier
Approximately 10½ inches
high at shoulder

seam (sēm) *n.* [ME *seem* < OE *sēam*.] 1. **a.** A line of junction formed by sewing together two pieces of material along their edges. **b.** A similar line, ridge, or groove formed by fitting or joining together two sections along their edges. **c.** A suture. **d.** A scar. 2. A line across a surface, as a crack or wrinkle. 3. A thin stratum or layer, as

of coal or rock. —**v.** **seamed, seam-ing, seams.** —**vt.** 1. To join or fit together with or as if with a seam. 2. To mark with a seamlike line, as a groove, scar, or wrinkle. 3. To form ridges in by purling. —**vi.** To develop fissures or furrows: CRACK. —**seam'er** *n.*

sea-maid'en (sē'mād'n) also **sea-maid** (-mād') *n.* A mermaid or sea nymph.

seaman (sē'man) *n.* 1. A mariner or sailor. 2. An enlisted person in the U.S. Navy or Coast Guard ranking above seaman apprentice and below petty officer.

seaman apprentice *n.* An enlisted person in the U.S. Navy or Coast Guard ranking above a seaman recruit and below a seaman.

seaman recruit *n.* An enlisted person of the lowest rank in the U.S. Navy or Coast Guard.

seaman-ship (sē'man-shīp) *n.* Skill in handling or navigating a boat or ship.

sea-mark (sē'mārk') *n.* 1. A landmark visible from the sea, used as a navigational guide. 2. The mark along a shoreline indicating the extent of high tide.

sea mew *n.* A coastal gull, esp. *Larus canus* of Europe.

sea mile *n.* A nautical mile.

sea milkwort *n.* A small fleshy plant, *Glaux maritima* of shores and brackish marshes, with pink or white flowers.

seam-less (sēm'lis) *adj.* Lacking seams. —**seam'less-ness** *n.*

sea-mount (sē'mount') *n.* A submarine mountain having a summit at least 1,000 feet below sea level.

sea mouse *n.* A segmented marine worm of the genus *Aphrodite*, esp. *A. aculeata*, with overlapping scales covered by long hairs.

seam-ster (sēm'star) *n.* [ME *semeister* < OE *sēamestre* < *sēam*, seam.] A tailor.

seam-stress (sēm'strīs) *n.* A woman who sews, esp. one who makes her living by sewing.

seamy (sē'mē) *adj.* -i-er, -i-est. 1. Having or showing a seam or seams. 2. Rough and unattractive: SORDID. —**seam'i-ness** *n.*

se-ance (sē'āns', -āns') *n.* [Fr. < OFr., a sitting < *seoir*, to sit < Lat. *sedere*.] 1. A meeting at which persons attempt to receive spiritualistic messages. 2. A meeting or session.

sea oats *pl.n.* (sing. or *pl.* in number). A tall grass, *Uniola paniculata*, of the southern U.S. coast.

sea onion *n.* 1. A bulbous plant, *Urginea maritima* of the Mediterranean area, yielding a powder used medicinally and as a rat poison. 2. A small European plant, *Scilla verna*, with sweet-smelling blue flowers.

sea otter *n.* A large nearly extinct marine otter, *Enhydra lutris* of northern Pacific coasts, with a soft dark-brown coat.

sea pen *n.* [From its resemblance to a quill pen.] Any of various marine anthozoans of the families Stylaulidae and Funiculinidae, resembling and related to the sea feathers.

sea-plane (sē'plān') *n.* An aircraft having floats for taking off from or landing on water.

sea-port (sē'pōrt', -pōrt') *n.* A harbor, town, or city with facilities for seagoing ships.

sea power *n.* 1. Naval strength. 2. A nation possessing or wielding great naval strength.

sea purse *n.* The purse-shaped egg case produced by skates and certain sharks.

sea-quake (sē'kwāk') *n.* An earthquake under the ocean floor.

sear¹ (sir) *v.* **seared, searing, sears.** [ME *seren* < OE *sēarian* < *sēar*, withered.] —**vt.** 1. To make withered or dried up: SHRIVEL. 2. To scorch, char, or burn the surface of with or as if with something hot. —**vi.** To become withered or dried up. —**n.** A mark or injury caused by searing.

sear² (sir) *n.* [Prob. < OFr. *serre*, lock < *serrer*, to grasp < L.Lat. *serare*, to bolt < Lat. *sera*, bar, bolt.] The catch in a gunlock that holds the hammer in a halfcocked or fully cocked position.

sear³ (sir) *adj.* var. of *SERE*¹.

sea raven *n.* A large sculpin, *Hemitripterus americanus* of the western North Atlantic.

search (sūrch) *v.* **searched, searching, search-es.** [ME *serchen* < OFr. *cerchier* < L.Lat. *circare*, to go around < Lat. *circus*, circle.]

—**vt.** 1. To examine or look over carefully in order to discover something: EXPLORE. 2. To examine or investigate carefully: PROBE <search one's conscience>. 3. To make a complete check of (a legal document): SCRUTINIZE <search a title>. 4. **a.** To examine in order to find something lost or concealed. **b.** To examine (a person or the personal effects of) in order to find something lost or concealed. 5. To come to know: LEARN. —**vi.** To conduct a complete investigation: SEEK <searching for answers to the riddle> —**n.** 1. An act or instance of searching. 2. The exercise of right of search. —**search'a-ble** *adj.* —**search'er** *n.*

search-ing (sūrch'ing) *adj.* 1. Examining carefully or completely <a searching investigation>. 2. Keenly observant <searching in-sights>.

sear⁴ (sir) *n.* [Prob. < OFr. *serre*, lock < *serrer*, to grasp < L.Lat. *serare*, to bolt < Lat. *sera*, bar, bolt.] The catch in a gunlock that holds the hammer in a halfcocked or fully cocked position.

sear⁵ (sir) *adj.* var. of *SERE*¹.

sea raven *n.* A large sculpin, *Hemitripterus americanus* of the western North Atlantic.

search (sūrch) *v.* **searched, searching, search-es.** [ME *serchen* < OFr. *cerchier* < L.Lat. *circare*, to go around < Lat. *circus*, circle.]

—**vt.** 1. To examine or look over carefully in order to discover something: EXPLORE. 2. To examine or investigate carefully: PROBE <search one's conscience>. 3. To make a complete check of (a legal document): SCRUTINIZE <search a title>. 4. **a.** To examine in order to find something lost or concealed. **b.** To examine (a person or the personal effects of) in order to find something lost or concealed. 5. To come to know: LEARN. —**vi.** To conduct a complete investigation: SEEK <searching for answers to the riddle> —**n.** 1. An act or instance of searching. 2. The exercise of right of search. —**search'a-ble** *adj.* —**search'er** *n.*

search-ing (sūrch'ing) *adj.* 1. Examining carefully or completely <a searching investigation>. 2. Keenly observant <searching in-sights>.

sear⁶ (sir) *n.* [Prob. < OFr. *serre*, lock < *serrer*, to grasp < L.Lat. *serare*, to bolt < Lat. *sera*, bar, bolt.] The catch in a gunlock that holds the hammer in a halfcocked or fully cocked position.

sear⁷ (sir) *adj.* var. of *SERE*¹.

sea raven *n.* A large sculpin, *Hemitripterus americanus* of the western North Atlantic.

search (sūrch) *v.* **searched, searching, search-es.** [ME *serchen* < OFr. *cerchier* < L.Lat. *circare*, to go around < Lat. *circus*, circle.]

—**vt.** 1. To examine or look over carefully in order to discover something: EXPLORE. 2. To examine or investigate carefully: PROBE <search one's conscience>. 3. To make a complete check of (a legal document): SCRUTINIZE <search a title>. 4. **a.** To examine in order to find something lost or concealed. **b.** To examine (a person or the personal effects of) in order to find something lost or concealed. 5. To come to know: LEARN. —**vi.** To conduct a complete investigation: SEEK <searching for answers to the riddle> —**n.** 1. An act or instance of searching. 2. The exercise of right of search. —**search'a-ble** *adj.* —**search'er** *n.*

search-ing (sūrch'ing) *adj.* 1. Examining carefully or completely <a searching investigation>. 2. Keenly observant <searching in-sights>.

sear⁸ (sir) *n.* [Prob. < OFr. *serre*, lock < *serrer*, to grasp < L.Lat. *serare*, to bolt < Lat. *sera*, bar, bolt.] The catch in a gunlock that holds the hammer in a halfcocked or fully cocked position.

sear⁹ (sir) *adj.* var. of *SERE*¹.